Lamk. The genus *Petrascula*, Gümb., is not admitted into the new system, at least not under that name.

The omission of Gümbel's genus *Gyroporella* is the more noticeable as that genus is particularly interesting with respect to the Alpine Formation, and was the first form which led to the group being referred to the Calcareous Algæ. Stache found it in the Dyasic (Permian) strata of the Gailthal massif. Gümbel, in 1871*, ranked *Diplopora*, Schafh., among the truly vegetable "Nulliporæ," and subsequently, in 1872, among those which he referred to animals. M. Munier-Chalmas's *Guembelina* is possibly identical with this genus.

The living Corallines inhabit shallow seas; and thus strata including Dactyloporidæ may also be regarded as shallow-water deposits. These fossils are prevalent in the Alpine Limestones (Schlern Dolomite, Wetterstein Limestones), thus affording a new argument in favour of Baron Richthofen's and Von Mojsisovics's theory of Alpine Coral-reefs. The groups of *Gyroporellæ* may have long grown in shallow waters at remote periods, just as in our days groups of *Nulliporæ* thrive within the surf-zone, and branching Calcareous Algæ within the less exposed shallows of the reefs in the South Sea.

XVII.—*On the Classification of the British Polyzoa.*

By the Rev. THOMAS HINCKS, B.A., F.R.S.

I PROPOSE to give in this paper an outline of certain portions of the classification adopted in the 'History of the British Marine Polyzoa,' which I hope shortly to publish. I shall confine myself for the present to the Cheilostomata, and shall merely sketch very slightly the general arrangement, adding a brief diagnosis of the new genera which I have found it necessary to constitute. I must reserve the discussion of many interesting points connected with the subject.

Class POLYZOA, J. V. Thompson.

Subclass HOLOBRANCHIA, E. Ray Lankester.

Group *a*. *ECTOPROCTA*, Nitsche.

Order **GYMNOLÆMATA**, Allman.

Suborder i. CHEILOSTOMATA, Busk.

Fam. 1. **Aeteidæ**.

A single genus, AETEA, Lamx.

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* Abhandlung. d. k.-bayer. Akad. der Wiss. math.-phys. Cl. vol. xi. See also Ann. & Mag. Nat. Hist. ser. 4, vol. viii. pp. 70, 71.

Fam. 2. **Eucrateidæ.**

This family includes the whole of the *Gemellariidæ*, Busk, except *Notamia*, an anomalous genus and type of a separate group, and *Didymia*, in which we find a totally distinct form of cell. *Eucratea*, the oldest genus, and one in which the family characters are strikingly represented, has been adopted as the type.

Genera: EUCRATEA, Lamx.
GEMELLARIA, Savigny.
SCRUPARIA, Hincks.

Zoarium erect, branches given off from the back of a cell, and facing in the opposite direction. *Zoœcia* subcalcareous, rising one from the other, so as to form a single series, or placed back to back; aperture small, unarmed, slightly oblique, terminal. *Ovicelligerous cells* imperfectly developed, placed back to back with the ordinary cells. No *avicularia* or *vibracula*.

Type *Scruparia clavata*, Hincks.

I have retained Oken's name *Scruparia*, with a new definition, for this form; it has been superseded by *Eucratea*, Lamx., and would otherwise lapse altogether.

HUXLEYA, Dyster.
(With revised character.)

BRETTIA, Dyster.

Brettia tubæformis, nov. sp.

Zoarium minute, transparent, dichotomously branched, surface smooth, attached by a number of tubular fibres. *Zoœcia* elongate, somewhat trumpet-shaped, slender and tubular below, and expanding gradually upwards, with a distinct joint a little above the base; aperture terminal, slightly oblique, suborbicular, with about ten short spines round the margin. *Oœcia* unknown.

Height about $\frac{1}{8}$ inch.

Localities. South-east coast (*R. S. Boswell*): Hebrides (*Norman*).

Fam. 3. **Cellulariidæ.**

Genera: CELLULARIA, Pallas.
MENIPEA, Lamx.
SCRUPOCELLARIA, Van Beneden.
CABEREA, Lamx.

Fam. 4. **Bicellariidæ.**

Genera: BICELLARIA, Blainville.

BUGULA, Oken.

Species new to Britain, *B. gracilis*, Busk, var. *uncinata.*

BEANIA, Johnston.

Fam. 5. **Notamiidæ.**

Genus NOTAMIA, Fleming.

Fam. 6. **Cellariidæ.**

Genus CELLARIA, Lamx. (part.).

Fam. 7. **Flustridæ.**

Genus FLUSTRA, Linnæus.

Fam. 8. **Membraniporidæ.**

In dealing with the section of the Polyzoa that includes the *Membraniporidæ* and *Escharidæ* of Busk, and some allied genera, there can, I think, be no doubt that, if we are seeking a natural classification, we must base the families, for the most part, on the characters of the zoœcium. To found them on the manner of growth (however convenient the method may be as an artificial contrivance) would be to place the mere accident before the essential elements of structure. Groups thus formed, instead of fitting in with natural affinities, would traverse them at all points. The venerable family of the *Escharidæ* (auctt.) is a mere jumble of incongruous elements, and no more represents the order of nature (the actual relationships of the forms which compose it) than would a group of plants founded on the colour of their flowers. Whatever judgment may ultimately prevail respecting the constitution of *genera*, it will hardly, I think, be disputed that the first step towards a natural classification in this department must be the reform, in the sense which I have indicated, of the larger groups.

Genera: MEMBRANIPORA, Blainville.

MEGAPORA, Hincks.

Fam. 9. **Microporidæ.**

Genera: MICROPORA, Gray.

STEGANOPORELLA, Smitt.

Species new to Britain, *S. Smittii*, mihi (=*Membranipora andegavensis*, Busk, 'Crag Polyzoa;' but not, I believe, the *Eschara andegavensis* of Michelin).

SETOSELLA, Hincks.

Fam. 10. **Cribrilinidæ.**

Genera: CRIBRILINA, Gray.

Type *C. radiata*, Moll.

MEMBRANIPORELLA, Smitt.

Type *M. nitida*, Johnston.

Fam. 11. **Microporellidæ.**

Genera: MICROPORELLA, Hincks.

Type *M. ciliata*, Pallas.

DIPORULA, nov. gen.

Zoœcia calcareous, without a membranous area or raised margins; orifice arched and expanded above, contracted below, and slightly constricted by two lateral projections (horseshoe-shaped), lower margin straight and entire; a semilunate pore on the front wall. *Avicularia.* *Zoarium* (in the only British species) erect, with cylindrical branches.

Type *D. verrucosa*, Peach.

CHORIZOPORA, nov. gen.

Zoœcia without a membranous area or raised margins, more or less distant, connected by a tubular network; orifice semicircular, with the inferior margin entire; no special pore.

Type *C. Brongniartii*, Audouin.

Fam. 12. **Porinidæ** (part.), D'Orbigny.

Genera: PORINA, D'Orbigny.

ANARTHROPORA, Smitt.

LAGENOPORA, Hincks.

? CELLEPORELLA, Gray.

Including *C. lepralioides*, Norman, and *C. pygmæa*, id.

I feel very doubtful as to the true position of these forms.

Their affinities are obscure; but they have no relationship with *Cellepora*, as their name might be taken to imply. The free tubular orifice with which both the species are furnished is a Porinidan character; and on the strength of it I place them, provisionally at least, in this group.

Fam. 13. **Myriozoidæ** (part.), Smitt.

Genera: SCHIZOPORELLA, Hincks.

This genus includes members of the old *Lepralia*, Johnston, with a semicircular or suborbicular orifice, and a sinus on the lower margin, however they may differ in superficial sculpture, in the number and position of the avicularia (most unstable characters), the shape of the cells, or the habit of growth. *Hemeschara sanguinea*, Norman, also finds a place in it, ranking alongside its near ally *Lepralia linearis*, Johnston.

I have not separated from it *Lepralia venusta*, Norman, notwithstanding the remarkable shape of its orifice, as we have transitional forms between it and the usual structure in this genus (e. g. in *S. sanguinea*), and the peculiarity lies in a mere matter of detail, and does not affect the type.

Schizoporella cristata, nov. sp.

Zoœcia small, short-ovate or rhomboidal, distinct, convex, divided by rather deep sutures; surface silvery, smooth or slightly furrowed, with a few punctures; orifice suborbicular, with a central sinus below, and five marginal spines; immediately under the lower margin a prominent mucro, from which the elevated peristome passes off on each side, forming with it a wall round a large proportion of the orifice; on the inner side of the mucro a very small and delicate *avicularium*, with pointed mandible directed straight upwards. *Oœcia* (proportionally) large, subglobose, punctured, with an erect, crest-like ridge running across them at the top.

Primary cell very small, suborbicular, sides sloping steeply upwards, the summit occupied by an oval area, at the upper part of which is placed the semicircular orifice, sinuated below; six spines round the orifice and three on the lower border of the area.

Loc. Hastings, on *Pecten maximus* (*Miss Jelly*).

MASTIGOPHORA, Hincks.

Type *M. Hyndmanni*, Johnston.

SCHIZOTHECA, Hincks.

The two species included in this genus (*S. fissa*, Busk, and *S. divisa*, Norman) have the primary orifice sinuated, but are distinguished by their raised tubular secondary orifice, notched in front, and (as a subordinate character) by the fissured ovicell.

HIPPOTHOA, Lamx.

I retain this genus for the forms with distant, caudate cells, and a small aperture completely covered (or nearly so) by the opercular valve (*i. e.* destitute of any membranous area). *H. catenularia* auctt. belongs, as Smitt has already pointed out, to the genus *Membranipora*.

Fam. 14. **Escharidæ.**

Genera: LEPRALIA (part.), Johnston.

This genus is adopted as limited by Smitt, and embraces forms with a more or less horseshoe-shaped orifice, the lower margin of which is neither sinuated nor elevated into a mucro. I have ranged under it one or two species whose systematic position is somewhat doubtful, but which seem to agree with it more nearly than with any other group. One of these, *Lepralia pertusa*, Esper, has been much misunderstood; and very distinct forms have been referred to it by authors. I cannot agree with Smitt in ranging it alongside *Schizoporella sanguinea*, Norman, as it has in no true sense a sinuated margin. The two lateral projections by which the orifice is constricted are placed very near the bottom of it; and just beneath them the lower lip curves slightly outwards, as it commonly does in the present genus; but there is no approach to a sinus. The general character of the cell, as well as the structure of the orifice, ally it to this genus. Another doubtful species, *Lepralia polita*, Norman, is placed here on the strength of its simple semielliptical orifice, with a slightly curved lower margin, which is without sinus, denticle, or mucro.

Eschara foliacea auctt. of course finds its place beside *Lepralia Pallasiana*, Moll. Whatever amount of doubt there may be as to associating definitely branched with crustaceous forms in the same genus, there can, I conceive, be none as to the propriety of uniting the latter with such kindred species as are erect and *foliaceous*, whether they be unilamellate (*Hemeschara* of authors) or bilamellate (*Eschara*). The three conditions are met with in the same *species*, according to age and other circumstances. In some cases the crustaceous habit prevails, as in *Lepralia Landsborovii*, Johnston, in which the relation of the three modes of growth may be well studied; in others the foliaceous, as in *Eschara foliacea* auctt. These differences involve neither change in the plan of gemmation nor any other structural peculiarity, and are really quite immaterial.

The following species belong to the genus *Lepralia*:—

L. Pallasiana, Moll.
L. canthariformis, Busk.
L. foliacea, Ellis and Solander.
L. pertusa, Esper.
L. adpressa, Busk.
L. hippopus, Smitt.
L. edax, Busk.
?*L. polita*, Norman (a somewhat aberrant form).

PORELLA, Gray.

Zoœcia with the primary orifice semicircular; secondary (or adult) orifice elongate, inversely subtriangular or horseshoe-shaped; an avicularium, usually with a rounded mandible, within the lower margin.

I place in this genus the following:—

P. concinna, Busk.
P. minuta, Norman.
P. struma, id. (*Hemeschara* auctt.).

With erect zoarium.

P. compressa, Sowerby (= *Cell. cervicornis*, Johnston).
P. lævis, Fleming.

All the species here associated possess zoœcia which are essentially identical in the adult state, and pass through the very same course of development. A minute and careful study of all the forms has convinced me that, *so far as the cell is concerned*, they are most intimately connected, and that none but specific distinctions exist amongst them. The various phases of the cell-growth correspond throughout the series. *Porella concinna* and *Porella compressa* (*cervicornis*) have precisely similar structural elements: their habit of growth is dissimilar. The question arises, Is the minute agreement of the cells, or the difference in their grouping the most important point? Is it more philosophical to unite them in one genus on the strength of their structural similarity or to separate them for their diverse habit? If they are separated, it must be on the single ground of the difference in the grouping of the cells; and were this course adopted in such a protean class as the Polyzoa, we should have an indefinite multiplication of genera (see D'Orbigny's system of classification). The essential structure of the individual cell must certainly be accounted the most important point, both in itself and as a clue to relationship; and by giving the mere grouping a coordinate place beside it we should run the risk, it seems to me, of diverting attention from those natural affinities which it is the great object of all our classification, as far as possible, to indicate.

Unless we are content with the old (and certainly very simple) method of lumping all erect forms together, without any reference whatever to the cell, we have only a choice between these two courses—to found genera for the variations of growth as well as for the more important modifications of cell in each family, or to make the zoœcium the basis of the genus and treat the ordinary variations of habit subsectionally. I was at one time inclined to the former method *; but further experience of the practical work of classifying the Polyzoa has brought me, to a much greater extent, into sympathy with Prof. Smitt's views. In a case like the present the true end of classification, the display of natural relationship, will, I think, be best attained by throwing the species with similar cells into one genus, and marking by distinct headings the varieties of growth.

It may be noted here that no recent systematist, if we except D'Orbigny, has proposed to separate the crustaceous *Celleporæ* from those which are erect and ramose; yet the latter are as definite in their branching and the structure of their stems as the *Escharæ*. And, to take an analogous case in another section of the Polyzoa, by universal consent the incrusting and the up-growing ramified *Alcyonidia* are grouped in one genus.

SMITTIA, nov. gen.

(=*Escharella*, Smitt, not of D'Orbigny.)

Zoœcia with the primary orifice suborbicular, the lower margin entire and dentate; peristome elevated and forming a secondary orifice, which is channelled in front; generally an avicularium below the sinus. The *zoarium* in British species is either incrusting or rises into foliaceous expansions, with the cells in a single or double layer.

For this group Smitt employs the name *Escharella*; and there would be the weightiest reasons for respecting his practice if this designation had not been so variously used that nothing but confusion seems likely to be caused by perpetuating it. It was first introduced by Gray, accompanied by an unintelligible diagnosis, for a miscellaneous group of *Lepraliæ*, none of them referable to the present genus. D'Orbigny afterwards connected it with a very definite form, allied to our *Cribrilina* (or identical with it), and made it the type of a family, the Escharellidæ. Smitt himself has not been very constant in his mode of applying the name, having first given it to a somewhat heterogeneous collection of species and afterwards to a mere section of it.

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* *Vide* a paper by the author in the 'Annals' for December, 1877, p. 523.

It seems undesirable that terms which have been thus bandied about until they have been emptied of all fixed meaning should be retained. Science is only confused by the perpetuation of names which have been used as labels, now for one form and now for another. And especially may it be deemed objectionable to appropriate and put to a totally different use a term which has a place in so important a work as the 'Paléontologie Française.' I have great pleasure in substituting for this questionable name another which commemorates one of the most able workers in this department of zoology.

This is a very natural and well-defined generic group, and includes the following British species:—

Species: *S. Landsborovii*, Johnston.
S. porifera, Smitt.
S. crystallina, Norman (? var. of *Landsborovii*).
S. reticulata, Macgillivray.
S. affinis, Hincks.
S. trispinosa, Johnston.
S. cheilostoma, Manzoni.
S. marmorea, Hincks.
S. bella, Busk.

PHYLACTELLA[*], nov. gen.

Zoœcia with the primary orifice more or less semicircular, the lower margin sometimes dentate, surrounded by an elevated peristome, which is not produced or channelled in front. No avicularia.

Species: *P. labrosa*, Busk.
P. collaris, Norman.
P. eximia, Hincks.

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[*] From φυλακτὸς, fortified.

This genus is instituted for two or three species which seem to lie outside the preceding group, though nearly related to it. *P. labrosa*, with its triplet of denticles, its elevated peristome, and its porous surface, exhibits much affinity with such forms as *S. Landsborovii* and *S. crystallina*. *P. eximia* agrees with it in most points; but the pores are only present round the margin. In *P. collaris* both pores and denticles have disappeared. The chief distinction between this genus and the last lies in the character of the secondary orifice, which in *Smittia* contracts in front into a deep channelled sinus, whilst in *Phylactella* it is rounded in front and entire. The primary orifice in the present group is almost semicircular; and there is a total absence of avicularia.

ESCHAROIDES or ESCHARA, Smitt.

Under one of these names two species may be associated, which, I believe, exhibit essentially the same structure of cell, though the zoarium is in one case compressed and branched, in the other cylindrical, and, as far as we know, simple—differences which are not of any special importance.

Zoœcia with the primary orifice suborbicular; peristome much elevated, and forming a secondary orifice, arched above and with a sinus below, within which an avicularium is enclosed.

Species: *E. rosacea*, Busk.
E. quincuncialis, Norman.

MUCRONELLA, Hincks.

This genus is equivalent to the *Discopora* of Smitt, but not of Fleming, who originated the name for species belonging to a totally different section of the Polyzoa (the Cyclostomata), with which it is still connected in the slightly modified form *Discoporella*. It includes a considerable number of British species, which constitute one of the best-defined groups in this section.

Species: *M. Peachii*, Johnston.
M. ventricosa, Hassall.
M. variolosa, Johnston.
M. laqueata, Norman.
M. abyssicola, id.
?*M. microstoma*, id.
M. coccinea, Johnston.
?*M. pavonella*, Alder.

PALMICELLARIA, Alder.

From a careful study of the structure and development of the zoœcia in the three species ranked under this genus, I have little doubt that they are rightly associated. The form first described by Alder under this name had its cells disposed in *four* longitudinal series, and in this respect differs from its congeners; but the mere number of the rows can have no generic import *.

Zoœcia with the primary orifice orbicular, or varying from semicircular to semielliptical; the peristome elevated around it and carried out into a projecting palmate or mucronate process, with an avicularium on its inner aspect. *Zoarium*, in the British species, erect and ramose.

Species: *P. elegans*, Alder.
P. Skenei, Ellis and Solander.
P. lorea, Alder.
? ? *P. cribraria*, Johnston.

RHYNCHOPORA, Hincks.

Species: *R. bispinosa*, Johnston.

Fam. 14. **Celleporidæ.**

In his later writings Prof. Smitt has abandoned this family, and has placed his genus *Cellepora* amongst the Myriozoidæ. With great deference to his opinion, I venture to think that there are sufficient grounds for its retention. The erect habit of the cells and the confused way in which they are aggregated are not the only characters which distinguish this section and mark it off from the neighbouring families.

The character of the cells is very uniform and distinctive; in this respect the facies of the group is well marked and sufficiently differentiates it. The zoœcium is more or less urceolate, with a perfectly terminal orifice; and the peristome is usually much elevated round it and carried up into one or more prominent rostra, supporting avicularia. The zoœcial characters, as it seems to me, supply a good basis for the family, and, in combination with the vertical habit and the irregular gemmation, indicate a very natural group.

Genera: CELLEPORA (part.), Fabricius.
CELLEPORARIA, Smitt (not Lamx. or D'Orbigny).

The latter genus will include our British *C. Hassallii*.

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* I have not ranged the *Lepralia verrucosa*, Esper, under any of the foregoing genera. It is allied (and not distantly) to *Palmicellaria* through the structure of the zoœcial orifice; but there are differences between the two forms which make me hesitate to unite them. Possibly it may be necessary to constitute a genus for the reception of this species.

Fam. 15. **Reteporidæ.**

Smitt has also discarded this family in his latest paper*, and distributed its members. In this I do not see my way to agree with him at present. The structure of the zoarium in *Retepora* is so remarkable and significant that it seems to me to be rightly regarded as the basis of a family. It seems hardly probable that forms exhibiting this marked zoarial peculiarity would be developed sporadically in various groups. It is a more reasonable supposition that the species in which it exists are closely connected genetically.

In taking this view I assume that the structural differences between the zoarium of *Retepora* and that of the other allied Cheilostomata go much beyond the mere reticulate character of the branching†.

Our two British species of this family may be ranked under one genus.

Genus RETEPORA, Lamarck.

Species: *R. Beaniana*, King.
R. Couchii, Hincks.

The foregoing is little more than a mere indication of results. The detailed observations on which they rest and the discussion of doubtful points must be reserved for my ‘History.’

No one who has not attempted to frame a natural classification of the Polyzoa can appreciate the peculiar and perplexing difficulties attendant upon the work. Those who have done so will best understand how much indefiniteness must of necessity attach to any system we may devise, how flexible and accommodating it must be to fit in with the facts of nature.

XVIII.—*On the Occurrence of a Land-Rail* (Rallus) *in the Island of Aldabra*. By Dr. A. GÜNTHER, F.R.S.

IN the year 1876 Commander Wharton started in H.M.S. ‘Fawn’ on a voyage of survey to the East-African coast; and

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* “Recensio systematica Bryoz. quæ ad insulas Novaja Semlja et ad ostium fluminis Jenisei invenerunt Doctores A. Stuxberg et H. Théel,” Œfv. Kongl. Vetenskaps-Ak. Förhandl. 1878.

† A difficulty occurs in the case of the *Membranipora sigillata*, Smitt, described in his ‘Floridan Bryozoa,’ which, according to his account, combines a true Membraniporidan cell with a Reteporine mode of growth. But, on the whole, at present, the reasons for preserving the family seem to me stronger than those for dismembering it. The point requires more extended investigation.